

REMARKS/ARGUMENTS

FIG. 1 shows an exemplary optical switch as known in the art. The optical switch includes an input lens array 110, first and second MEMS arrays 120 and 130, and an output lens array 140.

FIG. 2 shows an exemplary MEMS array as known in the art. It is well known in the art that a MEMS array includes a number of MEMS mirrors formed on a substrate and a cover attached to the substrate over the MEMS mirrors. The supporting text describes the MEMS array as including “a substrate 210, a number of mirrors 220 formed on or from the substrate 210, and a cover 230.” Thus, each of the MEMS arrays 120 and 130 includes a substrate 210, a number of mirrors 220 formed on or from the substrate 210, and a cover 230. Among other things, the cover 230 physically protects the MEMS mirrors and allows optical signals to pass to and from the MEMS mirrors. With reference to FIG. 2, the supporting text indicates that the cover “protects the extremely fragile mirrors 220 and also enables optical signals to pass to and from the mirrors 220.” For example, the cover prevents dust and other objects from touching the MEMS mirrors, and may also form a seal to prevent water, air, or other materials from contaminating the MEMS mirrors. The cover is typically optically clear in order to allow optical signals to pass to and from the MEMS mirrors. As shown in FIG. 2, the cover is typically a flat block made from glass or other material, and provides essentially no optical power.

FIG. 5 shows a prior art variation of the optical switch of FIG. 1 that includes additional optics. Specifically, additional lenses 510 and 520 are placed between the first MEMS array 120 and the second MEMS array 130. The MEMS arrays 110/120 implicitly include prior art covers, as shown in FIG. 2, and therefore additional optics are required if adjustment of the optical fields is desired, as shown in FIG. 5. As discussed in the application, “the additional optics add substantial cost and complexity to the optical switch. For example,

the additional lenses must be precisely machined and positioned within the optical switch.”.

In embodiments of the present invention, a MEMS array includes an integral covering lens 630. As discussed in the application, “[a]s with the cover 230 of the MEMS array 200 described above, the covering lens 630 of the MEMS array 600 also protects the extremely fragile mirrors 620.” Thus, the covering lens acts as both a cover for the MEMS array (e.g., for protecting the mirrors) and a lens for adjusting the optical field. The integral covering lens can eliminate the need for additional optics, as shown in FIG. 9.

It is clear that the lenses 510 and 520 are not part of the MEMS arrays 120 and 130 and are not “covers” for the MEMS arrays 120 and 130 because each of the MEMS arrays 120 and 130 already has a cover 230. Thus, the lenses 510 and 520 cannot be “covering lenses” for the purposes of the claimed invention. The “covering lens” can be clearly distinguished from prior art embodiments, which typically utilize a covered MEMS array and one or more external lenses to adjust the optical field of the MEMS array.

For these same reasons, it is clear that the lenses 107/117 (or, perhaps, lenses 109/117) in the Neilson reference are not “covering lenses” for purposes of the claimed invention because they do not act as covers for their respective MEMS arrays and in fact are not even part of the MEMS arrays but are instead external lenses used to direct optical signals to and from the MEMS arrays.

Claims 1, 7, 8, and 9 have been amended to require a MEMS array having an integral covering lens for covering the movable mirrors and adjusting an optical field of at least one of the plurality of mirrors. The claims are not anticipated by the prior art of record including prior art discussed in the application and the Neilson reference. Furthermore, the amendments eliminate wording that led to the Examiner’s objection to the drawings, and therefore correction of the drawings is no longer necessary.

All pending claims are believed to be in a form suitable for allowance. Therefore, the application is believed to be in a condition for allowance. The

Applicant respectfully requests reinstatement of the withdrawn claims and early allowance of the application. The Applicant requests that the Examiner contact the undersigned, Jeffrey T. Klayman, if it will assist further examination of this application.

Respectfully submitted,



Jeffrey T. Klayman
Attorney for Applicant
Registration No. 39,250

BROMBERG & SUNSTEIN LLP
125 Summer Street
Boston, MA 02110-1618
(617) 443-9292

02550/00118 386704.1